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DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP
2101 L Street, NW
Washington, DC 20037

EXAMINER

CLEVELAND, MICHAEL B

ART UNIT PAPER NUMBER

1762

DATE MAILED: 02/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/730,041	Applicant(s) RAINA, KANWAL K.	
	Examiner Michael Cleveland	Art Unit 1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 24-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 24-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 24, 26, and 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neukermans (U.S. Patent 5,658,710, hereafter '710) in view of Cathey et al. (U.S. Patent 5,853,492, hereafter '492) and Miyamoto (U.S. Patent 5,747,384, hereafter '384).

Claim 24: '710 teaches a method of treating an array of silicon current emitters comprising:

a) exposing a native oxide-containing tip of the current emitters to a native oxide removal process (col. 3, lines 17-20), and

b) exposing the tip current emitter tips to a nitrogen infusion process.

'710 does not explicitly teach A) that the emitters are used in a flat display panel, nor B) that the tips are exposed to a plasma hydrogenation process in the presence of silane.

However, '710 does teach that the emitter tips may be used as an array (col. 3, lines 23-25). '492 teaches that silicon emitter tips (col. 2, lines 63-65) may be used in flat panel displays (col. 1, lines 22-25) and may possess native oxide coatings that decrease efficiencies of the emitters when coated with other materials (col. 1, lines 35-57). '492 teaches the efficiency may be improved by removing native oxide coatings may be removed by hydrogen termination (col. 2, lines 27-47). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have removed any native oxide from the silicon emitter tip of '710 before applying the coating to reduce the amount of energy necessary to operate the tip (as taught by '492, col. 1, lines 35-57). '710 and '492 do not explicitly teach removing the native oxide coating by treating with a silane gas.

'384 teaches that native oxides may be removed from silicon by plasma treatment including hydrogen and silane (col. 5, lines 31-35, col. 10, lines 44-54). Therefore, it would

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have been obvious to one of ordinary skill in the art at the time the invention was made to have removed any native oxide from the silicon emitter tips of '710 by the plasma hydrogenation method of '384 instead of the HF method of '492 with a reasonable expectation of success and with the expectation of similar results because '384 teaches that such treatment also removes native oxides from silicon.

Claim 26: The nitrogen treatment may take place with ammonia ('710, col. 5, lines 35-41).

Claim 30: The process may be practiced on a plurality of current emitters ('710, col. 3, lines 21-25; '492, Fig. 1).

Claim 31: The emitters are sealed inside a field emission display (FED) device ('492, col. 3, line 60-col. 4, line 3).

3. Claims 25, 32-33, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neukermans '710 in view of Cathey '492, Miyamoto '384, as applied to claim 24, and further in view of Shimbo (U.S. Patent 4,624,737, hereafter '737).

'710, '492, and '384 are described above, but do not explicitly teach that the treatment with silane and the nitridation occur in the same chamber.

'737 teaches that consecutive plasma deposition processes may be performed in the same chamber (col. 2, lines 24-33). '737 does not clearly explain the advantage of such a feature, although it does hint at the advantage of reducing contamination (col. 2, lines 33-36). However, it is very well known in the vapor deposition art that performing successive steps in the same chamber reduces the number of processing steps (and thus the manufacturing cost) and reduces the opportunity for contamination. (See references cited in conclusion for evidence of these assertions.) Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have performed the two plasma CVD processes in the same chamber in order to have reduced the risk of contamination and to have reduced the number of process steps with a reasonable expectation of success.

Claim 33: The focus of '384 (Examples) on the process variables such as gas flow rates, suggests that the flow rates of the materials are result-effective variables. Therefore, it would

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have been obvious to one of ordinary skill in the art at the time the invention was made to have chosen the silane flow rate through routine experimentation.

4. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Neukermans '710 in view of Cathey '492, Miyamoto '384, as applied to claim 24, and further in view of Maa (U.S. Patent 4,411,734, hereafter '734).

'710, '492, and '384 are discussed above, but do not explicitly teach that the tips are exposed to a plasma hydrogenation process in the presence of silane with a flow rate of about 1200 sccm, an RF power of about 200-300 W, a pressure of about 1.2 torr, and a period of about 5-10 minutes.

The focus of '384 (Examples) on the process variables such as pressure, gas flow rates, and RF powers suggests that the flow rates of the materials are result-effective variables. Maa '734 likewise indicates that the power, pressure, and time are result-effective variables during the plasma cleaning of native oxides (col. 2, line 66-col. 3, line 10). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have chosen the optimum pressure, RF power, and silane flow rate through routine experimentation.

5. Claims 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neukermans '710 in view of Cathey '492, Miyamoto '384, Maa '734, as applied to claim 27 above, and further in view of Iyer et al. (U.S. Patent 5,917,213, hereafter '213).

'710, '492, '384, and '734 are described above, but do not explicitly teach the nitridation occurs with an ammonia flow rate of 500 sccm, an RF power of about 300-400 W, a chamber pressure of 1200 mtorr, and a period of about 10-15 minutes.

'213 teaches that during plasma treatment of silicon, particularly the plasma nitridation of silicon surfaces, the pressure, gas flow rate, power, and time are chosen to achieve the desired results (col. 5, lines 59-col. 6, line 19). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have optimized the pressure, gas flow rate, power, and time in order to have achieved the desired results because '213 teaches that they are the process parameters that are manipulated by those of ordinary skill in the art to achieve results.

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6. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Neukermans '710 in view of Cathey '492, and Miyamoto '384, as applied to claim 24, and further in view of Doan et al. (U.S. Patent 5,186,670, hereafter '670).

Claim 8: '710, '492, and '384 are described above. '492 teaches that the emitter includes a base portion surround by an insulator (106) (See Fig. 1, col. 1, lines 9-20), but the references do not that the emitter may extend beyond the insulator. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07. '670 demonstrates that the suitability of configurations in which the emitter may extend beyond the insulator (See Fig. 2 of '670). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have performed the process of '710, '492, and '384 on emitters that protrude from an insulating layer because '670 demonstrate that such is an operative configuration of electron emissive arrays.

7. Claims 33-35 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neukermans '710 in view of Cathey '492 and Miyamoto '384, as applied to claim 24 above and further in view of Shimbo '737 for substantially the same reasons discussed above regarding claim 25 and Maa '734 for substantially the same reasons discussed above regarding claim 27.

8. Claims 33-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neukermans '710 in view of Cathey '492, Miyamoto '384, Maa '734, and Shimbo '737, as applied to claim 37, and further in view of Iyer '213 for substantially the same reasons discussed above regarding claim 28.

Double Patenting

9. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686

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F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10. Claims 24-38 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1, 3, 5, 7-11, and 24-27 of copending Application No. 10/120511. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because they merely represent different combinations and permutations of the various claimed features.

Response to Arguments

11. Applicant's arguments filed 12/28/2005 have been fully considered but they are not persuasive.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that Neukermans '710 is not specifically directed to current emitter tips. The argument is unconvincing because Neukermans '710 is specifically directed to improving the field emission of field emissive silicon tips (col. 3, lines 21-37, especially lines 33-35). Applicant's "current emitter tips" are for use in an FED (that is, *field emissive* display). Therefore, field emitters are current emitters. Accordingly, Neukermans '710 specifically teaches current emitters and specifically teaches that its nitrogen infusion process improves the field emission.

Applicant argues that Miyamoto does not teach that its process removes native oxides from silicon emitter tips and that therefore there is no motivation to combine it with Neukermans and Cathey. The argument is unconvincing because the strong emphasis by both Neukermans and Cathey on removing the native oxides from silicon emitter tips would have motivated one of ordinary skill in the art to seek out ways of removing native oxides from silicon. Miyamoto is therefore relevant because it teaches a specific process of removing native oxides from silicon (the importance of which is recognized by both Neukermans and Cathey) by hydrogenation using plasma enhanced CVD with a silane gas. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness.

Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945).

Regarding claim 33, Applicant argues that Neukermans, Cathey, and Miyamoto do not teach that the reaction both occur in the same chamber. The argument is unconvincing because Shimbo renders such usage obvious, as discussed regarding claims 25 and 32. Applicant does not contest that Shimbo is appropriately applied for this reason. The rejections of claims 33 and 35 have been joined with the rejections of claims 27 and 32.

Applicant argues that neither Miyamoto nor Maa (nor their combination) teaches the particular combination of parameters of Appellant's claim 1. The Examiner concedes that neither Miyamoto nor Maa teaches or suggests the particular combination of parameters of Appellant's claim 1. However, Miyamoto and Maa are sufficient to teach that one of ordinary skill in the art must necessarily choose gas flow rates, powers, pressures, and treatment times in order to perform the plasma processes, and that therefore one of ordinary skill in the art would have been alerted to have optimized these parameters through routine experimentation because they are the parameters that must be selected for plasma processes. Appellant has provided no evidence or argument of secondary considerations, such as unexpected results, to overcome the *prima facie* case obviousness.

Applicant argues that Iyer is directed to increasing capacitance. The argument is unconvincing because Iyer is merely cited as evidence of the level of skill of one of ordinary skill in the art of plasma treatment processes. It demonstrates that in plasma nitriding processes, the pressure, gas flow rate, power, and time are *predetermined* (i.e., chosen) to achieve the desired results (col. 4, lines 59-col. 5, line 19) (emphasis by examiner). Therefore, it would have

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been obvious to one of ordinary skill in the art at the time the invention was made to have optimized the pressure, gas flow rate, power, and time in order to have achieved the desired results because Iyer '213 teaches that they are the process parameters that are manipulated by those of ordinary skill in the art of plasma treatment processes to achieve the desired results. Both plasma treatments described by the art have gas flow rates, pressures, power, and treatment times. Iyer '213 is reasonably probative of the level of skill of plasma treatments in general (particularly in view of the teachings of Miyamoto '384 and Maa '734 that demonstrate the setting of these parameters in plasma treatment processes) and therefore demonstrates that the level of skill in the art is such that the gas flow rates, pressures, power, and treatment times should be "predetermined" (col. 4, line 67-col. 5, line 1).

The particular use of Iyer does not disguise that the level of one of ordinary skill in the art of plasma processes must choose these conditions. Engineers and scientists choose the proper conditions for processes via routine experimentation. Applicant has provided no evidence or argument of secondary considerations, such as unexpected results, to overcome the *prima facie* case obviousness.

In response to applicant's argument that the examiner has combined an excessive number of references, reliance on a large number of references in a rejection does not, without more, weigh against the obviousness of the claimed invention. See *In re Gorman*, 933 F.2d 982, 18 USPQ2d 1885 (Fed. Cir. 1991).

Applicant argues that Doan does not provide a motivation to combine Neukermans and Cathey. The argument is unconvincing because Cathey provides the motivation to combine Neukermans and Cathey by teaching a particular use for arrays of silicon field emitter tips and by emphasizing that native oxides should be removed before performing coating processes (such as the coating process of Neukermans, which also recognizes that the native oxide should be removed).

Applicant argues that a provisional double patenting rejection should be made over copending 10/120511. The argument is correct. Accordingly, the grounds of rejection are properly stated as a provisional rejection over a patent application. The provisional rejection cannot be held in abeyance.

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Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Togashi et al. (U.S. Patent 4,642,620, col. 17, lines 60-68) and Levine et al. (U.S. Patent 5,989,999, col. 3, lines 39-48) are cited for their teachings regarding successive processing steps occurring within the same chamber. Sandhu (U.S. Patent 5,888,906) is cited for its teachings regarding removing native oxides from silicon using silane (col. 5, lines 3-8) and the performance of subsequent steps without handling (col. 4, lines 1-6).

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cleveland whose telephone number is (571) 272-1418. The examiner can normally be reached on Monday-Thursday, 7-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michael Cleveland
Primary Examiner
Art Unit 1762

9/23/2005